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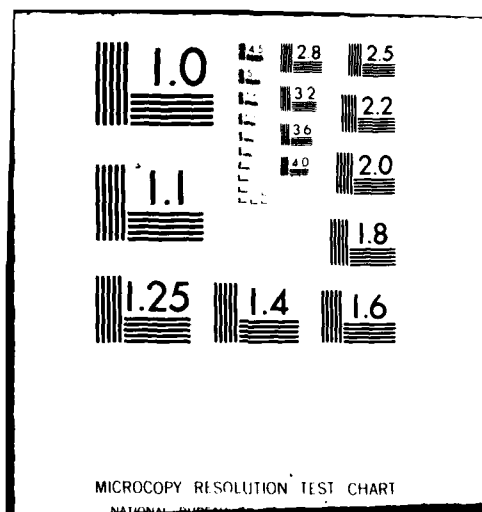
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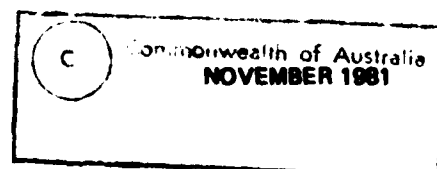
**TECHNICAL REPORT**  
**WSRL-0242-TR**

**A METHOD FOR THE ESTIMATION OF THE ATMOSPHERIC  
TEMPERATURE PROFILE**

K.H. LLOYD

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DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION

WEAPONS SYSTEMS RESEARCH LABORATORY



TECHNICAL REPORT

WSRL-0242-TR

A METHOD FOR THE ESTIMATION OF THE ATMOSPHERIC TEMPERATURE PROFILE

K.H. Lloyd

S U M M A R Y

A method is presented for the estimation of the temperature profile, given measured surface values of temperature and pressure, using conditional factors which are functions of statistical meteorological parameters. Tables of mean temperature profiles, and of the conditional factors from which temperature profiles may be estimated, are presented for several sites around Australia. These tables can be used when, for example, radiosonde data are not available.

This work was carried out at Weapons Systems Research Laboratory in response to Army Office Research Request 1139/78 - Task ARM 78/060 entitled Artillery Use of Meteorological Statistics (AUMS).



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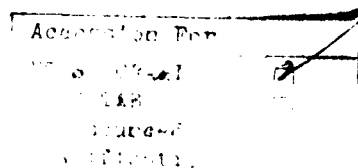
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A

## 1. INTRODUCTION

Included in the requirements for the Artillery Meteorological Message are the temperature and humidity profiles. When possible, these profiles are measured using sensors mounted in a sonde carried below the meteorological balloon which is used for determination of wind. In addition to the sonde, the measurement of temperature and humidity (mixing ratio) profiles requires a telemetry receiver and extensive data analysis. Because of the problems associated with the measurement of the temperature and humidity profiles, there would be significant benefits if a method could be developed for estimating the temperature and humidity profiles to an accuracy such that the contribution of errors from ballistic temperature and ballistic density were small compared with the other contributions to range and bearing errors.

This report presents a method for estimating the temperature profile, and gives in tabular format the necessary data for calculating the estimate for several sites around Australia. The technical background to this estimation method is given in references 1 and 2. It is shown in these reports that the error contribution of non-standard atmospheric conditions can be reduced by 40% if the temperature estimated by using this technique is used for calculating ballistic density and temperature. In addition, because the contribution of humidity to range dispersion is very small, adequate representation of the humidity profile is given by the mean profile for that site.

The next section gives a brief description of the background to the method, which makes use of calculated statistical relations between temperature and pressure variations. Section 3 discusses the problem of including both day-to-day and diurnal variations, and Section 4 explains the application of the method for estimating the temperature profile. The sites for which the appropriate statistics have been calculated are shown in figure 1.

## 2. STATISTICAL METEOROLOGICAL PARAMETERS

Because of correlations which exist between temperature variations at altitude and surface temperature and pressure variations, it is possible to make an estimate of the temperature profile when surface values are measured. To make these estimates it is necessary to calculate both these correlations and the standard deviations of the variations of temperature at various altitude levels, using a large number of Meteorological data.

Some of these statistics are available in publications of the Bureau of Meteorology. McRae(ref.3) presents tables of mean and standard deviation in temperature at nine pressure levels up to 100 mb, and also correlation coefficients between temperature variations at these levels. He used Meteorological data from 1953 until 1956, over which years the time for taking meteorological soundings was 0400 U.T. In 1957 the time at which the soundings were taken was changed by international agreement to 2400 U.T. (although Australia in fact takes theirs at 2300 U.T.), and Maher and Lee(ref.4) subsequently issued tables of the mean and standard deviation in surface pressure, and of temperature at twenty levels up to 10 mb, for data taken at 2300 U.T.; however, their tables did not include correlation coefficients. Maher and Lee's tables were, in fact, an updated version of the tables of Maher and McRae(ref.5) which gave seasonal values of mean and standard deviation at 0400 U.T. Because of the requirement for both temperature and pressure correlation coefficients to calculate the estimated temperature profile, we have computed all the correlation statistics using Meteorological Bureau data. At the same time, the means and the standard deviations have also been calculated so that all the statistical parameters used in the temperature estimation procedure come from the same set of data.

Table 1 in the back of this Memorandum gives calculated statistical parameters for a number of sites around Australia by season, at 2300 U.T. (the problem of observations at different times of the day is discussed in the next section). As can be seen, the tables give the mean, standard deviation and correlations of surface pressure, and of temperature at eleven altitudes up to the 100 mb level. As explained in references 1 and 2, these altitudes were used because they are the standard altitude levels at which the Meteorological Bureau archives its data. The Meteorological Bureau also keeps data at the 850 mb level, but this is an uneven pressure step, and has not been used here. The data at 150 mb have been used, because otherwise there is too large an altitude interval. The mean mixing ratio is also given in the tables.

In compiling the Meteorological Message, data at altitudes additional to those given in Table 1 are required. The values can either be interpolated from the tables, or read off a graph. Note that in Table 1 the annotation '1000 mb' refers to surface level.

### 3. THE NATURE OF THE TEMPERATURE VARIATIONS

The estimation of the temperature profile using the method of this Memorandum is based purely on statistical procedures. This is both its strength and its weakness. Its strength lies in that a relatively simple algorithm has been developed for estimating the temperature profile, which can be followed by rote once the surface values have been measured, so that no human judgement is involved. Its weakness lies in the fact that, since it is a purely statistical process, it can not make use of known meteorological processes, for example cold fronts.

Another problem which arises is that most of the data from which the statistical coefficients are calculated are of soundings taken at 2300 U.T. This means that, although these data are adequate for determining the statistics of day-to-day variations, they give no indication of diurnal variabilities. For these reasons the data for which both these variations were available, Woomera and Laverton, were examined carefully to see how a method could be developed for estimating the temperature profile which incorporated both diurnal and day-to-day variations(ref.2). It was found that the most satisfactory way in which this could be done was to remove from the measured value of the surface temperature the mean diurnal variation, thereby adjusting the observed value to an estimate of the value of 2300 U.T. This temperature was then used in the procedure of estimating the temperature profile. This estimated profile applied to 2300 U.T., so it is necessary to adjust the estimated profile to refer to the time of observation. These corrections were only done below the 800 mb level, because it was found that, statistically, diurnal variations above this level are mainly random and do not contain a significant diurnal contribution. It is assumed that the diurnal variation decreases linearly with altitudes, as illustrated in figure 2.

Reference 6 contains values of mean maximum and minimum temperature for the meteorological stations in Australia, from which an estimate of diurnal variations can be made. Table 2, using both reference 6 and additional data provided by the Meteorological Bureau, shows the mean diurnal variations in surface-temperature from 2300 U.T.

#### 4. EXPLANATION OF THE METHOD

The simplest, and poorest, estimate of the temperature profile is the mean value, calculated using meteorological data for that site, season, and, if possible, time. This would have to be done if a thermometer and barometer were not available to measure surface temperature and pressure. However, a significant improvement in the estimate of the temperature profile occurs when the surface values of temperature and pressure are measured. This not only gives exact values at the surface, but enables corrections to the mean temperature profile to be made. These corrections can be made because of the correlations which exist between changes in surface temperature and pressure, and in changes in the temperature profile. For example, suppose surface and 200 mb level temperature changes are anticorrelated, ie an increase in surface temperature above the mean value generally occurs when there is a decrease in temperature at 200 mb. Then, if the observed surface temperature is above the mean value, the best estimate of temperature at the 200 mb level will lie below the mean.

The correction to the mean profile is given by the product of the departure of the observed surface value from the mean value and a term which we have called the conditional factor. If  $\Delta P$  and  $\Delta T$  are the differences between the observed and mean value of surface pressure and surface temperature at 2300 U.T., then the correction which must be added to the mean temperature at any given level, to give the best estimate for temperature, is:

$$\text{temperature correction} = FP \times \Delta P + FT \times \Delta T$$

where FP and FT are the conditional factors mentioned above, whose values are a function of altitude. An alternative, and equivalent, method of defining conditional factors is in terms of fractional (percent) changes in surface pressure and temperature. Denoting these conditional factors by GP and GT we have:

$$\frac{\text{temperature correction}}{\text{mean temperature at given level}} = GP \times \frac{\Delta P}{P} + GT \times \frac{\Delta T}{T}$$

where P and T are mean surface values of pressure and temperature. GP, GT and FP, FT are related by:

$$\begin{aligned} GP &= FP \times (P/\text{mean temperature at given level}) \\ GT &= FT \times (T/\text{mean temperature at given level}) \end{aligned}$$

Although we do not use GP, GT in this Memorandum, they are discussed because ballistic density and temperature are calculated in terms of fractional (percent) changes, and it may in some applications be preferable to use GP, GT instead of FP, FT.

The conditional factors are a function of the standard deviations and correlations of the meteorological variables. The derivation of the mathematical expression for the conditional factors in terms of the statistical meteorological parameters is given in reference 2, and their values are included in Table 1.

The method for calculating the estimate of the temperature profile, for use in ballistic density and ballistic temperature calculations, is given in



Appendix I. This is in the format of a table, which could be easily incorporated into the software of any automated system for calculating artillery meteorological corrections. As can be seen, the differences between the mean and surface values for pressure and temperature are calculated (first converting the surface temperature to the equivalent value of 2300 U.T.). Then for each altitude, these differences are multiplied by the appropriate conditional factor, then added to the mean value to give the best estimate of the temperature profile.

## 5. CONCLUSION

The data given in Tables 1 and 2 enable corrections to the mean profile of temperature to be made, to give a better estimate of the temperature profile when surface values of temperature and pressure are known. This method is valuable when radiosonde measurements of the profile are not available. Because humidity (mixing ratio) variations are not significant, mean values for the humidity profile are sufficient.

Appendix I contains a table for the calculation of the estimated temperature profile. The calculations could be easily incorporated in the software of a computer dedicated to the calculation of artillery range and bearing corrections.

## 6. ACKNOWLEDGEMENTS

I wish to thank Mr D. Lee of the Meteorological Bureau for providing us with the meteorological data from which the statistics were calculated. I am grateful to Miss T. Tarnogursky of Flight Research Group for her assistance in computing the statistical parameters and the programming which was involved in this task.

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No.	Author	Title
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3	McRae, J.N.	"Statistics on Variability of Temperature and Geopotential, Australia. Surface to 100 mb". Bureau of Meteorology, Department of the Interior, 1977
4	Maher, J.V. and Lee, D.M.	"Upper Air Statistics, Australia - Surface to 5 mb, 1957 to 1975". Bureau of Meteorology, Department of the Interior, undated
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## APPENDIX I

## ESTIMATION OF TEMPERATURE PROFILE USING MEASURED SURFACE VALUES

Site \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

		<u>Unit</u>	<u>Ref.</u>	<u>Value</u>
a	Measured surface pressure	mb		
b	Mean surface pressure	mb	Table 1	
c	Difference in surface pressure	mb	a - b	
d	Measured surface temperature	°C		
e	Difference between mean surface temperature at time of measurement and at 2300 U.T.	°C	Table 2	
f	Measured surface temperature corrected to 2300 U.T.	°C	d - e	
g	Mean surface (ie 1000 mb) temperature at 2300 U.T.	°C	Table 1	
h	Difference in surface temperature	°C	f - g	

Data entered in table below:

i	Linear interpolation of e. to zero at 800 mb altitude (see figure 2)	
j	Conditional pressure factor, FP	Table 1
l	Conditional temperature factor, FT	Table 1

	i	j	k	l	m	n	Estimated temperature
Altitude mb	e interpol	FP Table 1	c x j	FT Table 1	h x l	T mean Table 1	n + i + k + m °C

TABLE 1. METEOROLOGICAL STATISTICAL PARAMETERS AND CONDITIONAL FACTORS

## (a) Broome

SPRING		MEAN SURFACE PRESSURE 1011.5 MB STANDARD DEVIATION IN SURF.PRESS. 2.2 MB									
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100
ALTITUDE KM	C.C	1.C	2.C	3.C	4.2	5.6	7.2	9.2	11.8	13.6	16.0
MEAN TEMPERATURE DEG C	23.	22.	15.	6.	-1.	-8.	-18.	-32.	-54.	-68.	-79.
STANDARD DEVIATION TEMP.	3.2	2.8	2.4	2.0	2.4	2.3	2.1	1.7	1.4	1.6	2.5
CORRLN.-SURF.PRES./TEMP.	-0.58	-0.46	-0.56	-0.44	0.05	-0.04	-0.05	-0.04	-0.13	-0.03	0.25
CORRLN.-SURF.TEMP./TEMP.	1.00	0.52	0.65	0.43	-0.12	-0.00	-0.03	-0.04	0.13	0.12	-0.19
MEAN MIXING RATIO GM/KG.	12.1	5.4	4.9	3.9	2.6	1.5	0.8	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.C	-0.29	-0.30	-0.27	-0.03	-0.06	-0.10	-0.08	-0.05	0.05	0.24
CONDITIONAL FACTOR FT	1.00	0.34	0.37	0.17	-0.10	-0.03	-0.06	-0.05	0.04	0.08	-0.06
FRACT. CCNDN. FACT GP	0.C	-0.99	-1.05	-0.98	-0.09	-0.23	-0.38	-0.32	-0.24	0.25	1.26
FRACT. CCNDN. FACT GT	1.00	0.34	0.38	0.18	-0.11	-0.03	-0.07	-0.07	0.05	0.12	-0.09

SUMMER		MEAN SURFACE PRESSURE 1005.7 MB STANDARD DEVIATION IN SURF.PRESS. 3.0 MB									
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100
ALTITUDE KM	0.C	1.C	2.C	3.C	4.2	5.6	7.2	9.2	11.8	13.6	16.0
MEAN TEMPERATURE DEG C	28.	24.	18.	10.	1.	-7.	-16.	-31.	-53.	-67.	-82.
STANDARD DEVIATION TEMP.	1.7	2.7	2.0	1.5	1.7	2.1	1.9	1.7	1.4	1.3	2.3
CORRLN.-SURF.PRES./TEMP.	0.15	0.16	0.09	-0.20	-0.37	-0.41	-0.48	-0.53	-0.42	-0.15	0.38
CORRLN.-SURF.TEMP./TEMP.	1.00	0.45	0.54	0.25	-0.21	-0.12	-0.16	-0.16	-0.07	-0.01	0.08
MEAN MIXING RATIO GM/KG.	18.0	10.2	7.6	5.8	4.0	2.3	1.3	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.C	0.09	0.01	-0.12	-0.20	-0.27	-0.29	-0.29	-0.19	-0.07	0.28
CONDITIONAL FACTOR FT	1.00	0.69	0.62	0.25	-0.16	-0.07	-0.09	-0.08	-0.01	0.01	0.04
FRACT. CCNDN. FACT GP	0.C	0.29	0.03	-0.44	-0.74	-1.02	-1.14	-1.21	-0.87	-0.33	1.49
FRACT. CCNDN. FACT GT	1.00	0.70	0.64	0.27	-0.17	-0.08	-0.11	-0.10	-0.01	0.01	0.06

AUTUMN		MEAN SURFACE PRESSURE 1008.9 MB STANDARD DEVIATION IN SURF.PRESS. 2.8 MB									
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100
ALTITUDE KM	0.C	1.C	2.C	3.C	4.2	5.6	7.2	9.2	11.8	13.6	16.0
MEAN TEMPERATURE DEG C	25.	23.	16.	8.	1.	-6.	-17.	-32.	-53.	-67.	-81.
STANDARD DEVIATION TEMP.	3.C	2.2	2.0	2.0	2.1	1.8	1.8	1.9	1.5	1.4	2.8
CORRLN.-SURF.PRES./TEMP.	-0.45	-0.10	-0.40	-0.41	-0.19	-0.27	-0.42	-0.53	-0.42	0.00	0.49
CORRLN.-SURF.TEMP./TEMP.	1.00	0.42	0.64	0.24	-0.13	0.07	0.18	0.22	0.22	0.08	-0.22
MEAN MIXING RATIO GM/KG.	15.7	8.4	6.8	5.2	3.4	2.1	1.1	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	0.08	-0.10	-0.27	-0.23	-0.19	-0.27	-0.35	-0.21	0.02	0.48
CONDITIONAL FACTOR FT	1.00	0.34	0.38	0.05	-0.19	-0.04	-0.00	-0.02	0.02	0.05	0.00
FRACT. CCNDN. FACT GP	0.0	0.29	-0.34	-0.96	-0.85	-0.73	-1.06	-1.48	-0.97	0.11	2.53
FRACT. CCNDN. FACT GT	1.00	0.34	0.39	0.06	-0.20	-0.04	-0.00	-0.02	0.02	0.07	0.01

WINTER		MEAN SURFACE PRESSURE 1014.5 MB STANDARD DEVIATION IN SURF.PRESS. 2.2 MB									
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100
ALTITUDE KM	0.C	1.C	2.C	3.C	4.2	5.6	7.2	9.2	11.8	13.6	16.0
MEAN TEMPERATURE DEG C	16.	17.	11.	7.	1.	-7.	-17.	-32.	-54.	-68.	-78.
STANDARD DEVIATION TEMP.	3.5	2.4	2.3	2.5	2.3	2.2	2.0	1.6	1.4	1.7	2.6
CORRLN.-SURF.PRES./TEMP.	-0.39	-0.35	-0.24	-0.10	0.02	-0.05	-0.11	-0.11	-0.06	-0.02	0.17
CORRLN.-SURF.TEMP./TEMP.	1.00	0.56	0.18	-0.12	-0.16	-0.06	0.03	0.02	0.09	0.09	-0.01
MEAN MIXING RATIO GM/KG.	7.2	5.0	4.6	3.4	2.4	1.6	0.9	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.17	-0.20	-0.19	-0.05	-0.09	-0.10	-0.08	-0.02	0.01	0.23
CONDITIONAL FACTOR FT	1.00	0.34	0.07	-0.13	-0.11	-0.06	-0.01	-0.01	0.03	0.05	0.05
FRACT. CCNDN. FACT GP	0.C	-0.61	-0.72	-0.68	-0.19	-0.33	-0.41	-0.33	-0.07	0.07	1.17
FRACT. CCNDN. FACT GT	1.00	0.34	0.07	-0.14	-0.12	-0.06	-0.01	-0.01	0.04	0.07	0.07

TABLE 1(CONTD.).

## (b) Darwin

SPRING		MEAN SURFACE PRESSURE 1709.5 MB STANDARD DEVIATION IN SURF.PRESS. 1.8 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	27.	20.	14.	9.	2.	-6.	-14.	-31.	-54.	-68.	-80.
STANDARD DEVIATION TEMP.	1.7	1.7	1.8	1.9	1.7	1.5	1.4	1.2	1.2	1.4	2.6
CORRLN.-SURF.PRES./TEMP.	-0.42	-0.42	-0.52	-0.22	0.08	-0.04	-0.03	-0.12	-0.12	0.00	0.33
CORRLN.-SURF.TEMP./TEMP.	1.00	0.49	0.59	0.06	-0.11	0.06	0.03	0.07	0.08	0.00	-0.29
MEAN MIXING RATIO GM/KG.	15.5	9.8	6.4	4.3	2.9	1.7	0.9	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.24	-0.33	-0.26	0.04	-0.02	-0.02	-0.08	-0.07	0.00	0.37
CONDITIONAL FACTOR FT	1.00	0.36	0.47	-0.04	-0.09	0.04	0.01	0.01	0.02	0.00	-0.28
FRACT. COND.N. FACT GP	0.0	-0.84	-1.17	-0.92	0.14	-0.06	-0.08	-0.31	-0.34	0.01	1.92
FRACT. COND.N. FACT GT	1.00	0.37	0.49	-0.04	-0.10	0.05	0.01	0.01	0.03	0.00	-0.43
SUMMER		MEAN SURFACE PRESSURE 1004.5 MB STANDARD DEVIATION IN SURF.PRESS. 2.3 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	28.	22.	16.	10.	2.	-5.	-15.	-30.	-53.	-68.	-83.
STANDARD DEVIATION TEMP.	1.9	1.3	1.3	1.2	1.3	1.2	1.1	1.2	1.1	1.1	2.1
CORRLN.-SURF.PRES./TEMP.	0.16	0.07	-0.07	-0.18	-0.24	-0.32	-0.36	-0.42	-0.25	0.06	0.27
CORRLN.-SURF.TEMP./TEMP.	1.00	0.27	0.33	0.10	-0.04	-0.05	-0.15	-0.24	-0.06	0.06	0.04
MEAN MIXING RATIO GM/KG.	18.6	12.9	9.1	6.3	4.4	2.8	1.4	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	0.02	-0.07	-0.10	-0.13	-0.16	-0.16	-0.19	-0.11	0.02	0.24
CONDITIONAL FACTOR FT	1.00	0.19	0.25	0.09	-0.00	-0.00	-0.06	-0.11	-0.01	0.03	-0.01
FRACT. COND.N. FACT GP	0.0	0.05	-0.25	-0.37	-0.49	-0.61	-0.64	-0.79	-0.52	0.12	1.25
FRACT. COND.N. FACT GT	1.00	0.19	0.26	0.09	-0.00	-0.00	-0.07	-0.13	-0.01	0.05	-0.01
AUTUMN		MEAN SURFACE PRESSURE 1006.5 MB STANDARD DEVIATION IN SURF.PRESS. 2.3 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	27.	21.	15.	9.	3.	-5.	-15.	-31.	-53.	-68.	-82.
STANDARD DEVIATION TEMP.	1.5	1.4	1.5	1.6	1.3	1.2	1.2	1.3	1.1	1.3	2.3
CORRLN.-SURF.PRES./TEMP.	-0.06	-0.17	-0.40	-0.01	-0.06	-0.01	-0.19	-0.43	-0.32	0.02	0.31
CORRLN.-SURF.TEMP./TEMP.	1.00	0.41	0.33	-0.03	-0.07	0.14	0.12	0.07	0.10	0.10	-0.03
MEAN MIXING RATIO GM/KG.	17.2	11.5	8.2	5.7	4.0	2.5	1.3	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.09	-0.25	-0.14	-0.03	-0.10	-0.22	-0.28	-0.15	0.01	0.31
CONDITIONAL FACTOR FT	1.00	0.26	0.31	-0.04	0.05	0.11	0.03	0.03	0.06	0.08	-0.01
FRACT. COND.N. FACT GP	0.0	-0.29	-0.97	-0.46	-0.12	-0.37	-0.77	-1.08	-0.68	0.06	1.62
FRACT. COND.N. FACT GT	1.00	0.26	0.32	-0.04	0.05	0.11	0.03	0.04	0.08	0.12	-0.02
WINTER		MEAN SURFACE PRESSURE 1010.9 MB STANDARD DEVIATION IN SURF.PRESS. 1.7 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	22.	13.	13.	7.	3.	-6.	-16.	-31.	-54.	-68.	-79.
STANDARD DEVIATION TEMP.	2.4	1.9	2.4	1.7	1.5	1.5	1.3	1.2	1.2	1.4	2.3
CORRLN.-SURF.PRES./TEMP.	-0.38	-0.44	-0.30	-0.13	-0.05	-0.07	-0.10	-0.13	-0.16	-0.05	0.19
CORRLN.-SURF.TEMP./TEMP.	1.00	0.66	0.07	-0.01	-0.05	0.02	0.02	0.02	0.05	0.04	-0.04
MEAN MIXING RATIO GM/KG.	10.2	7.3	5.0	3.5	2.5	1.7	0.9	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.24	-0.40	-0.15	-0.08	-0.07	-0.09	-0.11	-0.12	-0.03	0.28
CONDITIONAL FACTOR FT	1.00	0.42	-0.06	-0.05	-0.05	-0.01	-0.01	-0.02	-0.01	0.01	0.04
FRACT. COND.N. FACT GP	0.0	-0.83	-1.63	-0.55	-0.28	-0.36	-0.36	-0.44	-0.56	-0.16	1.44
FRACT. COND.N. FACT GT	1.00	0.43	-0.06	-0.05	-0.05	-0.01	-0.01	-0.02	-0.01	0.02	0.05

TABLE 1(CONTD.).

(c) Eagle Farm

SPRING		MEAN SURFACE PRESSURE 1019.0 MB STANDARD DEVIATION IN SURF.PRESS. 5.0 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	20.	12.	7.	1.	-6.	-15.	-26.	-38.	-53.	-62.	-67.	
STANDARD DEVIATION TEMP.	2.7	3.2	3.4	3.0	2.9	3.0	3.3	3.9	2.9	3.3	3.6	
CORRLN.-SURF.PRES./TEMP.	-0.22	-0.40	-0.35	-0.14	0.01	-0.00	-0.10	-0.12	-0.02	-0.01	-0.04	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.70	0.62	0.53	0.43	0.39	0.25	-0.07	-0.23	-0.15	-0.27	
MEAN MIXING RATIO GM/KG.	8.3	5.9	4.1	2.9	2.0	1.2	0.5	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	-0.17	-0.15	-0.01	0.07	0.05	-0.03	-0.11	-0.05	-0.03	-0.08	
CONDITIONAL FACTOR FT	1.00	0.79	0.75	0.59	0.49	0.47	0.31	-0.15	-0.27	-0.20	-0.39	
FRACT. COND.N. FACT GP	0.0	-0.59	-0.56	-0.04	0.25	0.21	-0.13	-0.50	-0.21	-0.14	-0.37	
FRACT. COND.N. FACT GT	1.00	0.81	0.78	0.63	0.54	0.53	0.36	-0.19	-0.36	-0.28	-0.56	

SUMMER		MEAN SURFACE PRESSURE 1012.5 MB STANDARD DEVIATION IN SURF.PRESS. 4.2 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	25.	17.	12.	5.	-1.	-9.	-21.	-36.	-54.	-64.	-73.	
STANDARD DEVIATION TEMP.	2.1	2.7	3.0	2.4	2.4	2.4	3.0	3.4	3.2	2.5	3.7	
CORRLN.-SURF.PRES./TEMP.	-0.21	-0.56	-0.39	-0.17	-0.14	-0.20	-0.23	-0.31	-0.22	0.04	0.15	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.57	0.50	0.33	0.26	0.22	0.19	0.14	0.03	-0.17	-0.21	
MEAN MIXING RATIO GM/KG.	17.5	9.3	6.3	4.2	2.9	1.9	0.9	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	-0.30	-0.21	-0.05	-0.05	-0.09	-0.15	-0.24	-0.16	-0.00	0.10	
CONDITIONAL FACTOR FT	1.00	0.60	0.62	0.40	0.27	0.23	0.20	0.12	-0.02	-0.20	-0.32	
FRACT. COND.N. FACT GP	0.0	-1.05	-0.75	-0.18	-0.19	-0.36	-0.58	-1.02	-0.76	-0.00	0.49	
FRACT. COND.N. FACT GT	1.00	0.64	0.65	0.43	0.30	0.25	0.24	0.16	-0.03	-0.29	-0.47	

AUTUMN		MEAN SURFACE PRESSURE 1016.4 MB STANDARD DEVIATION IN SURF.PRESS. 4.5 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	22.	15.	10.	5.	-2.	-10.	-22.	-36.	-54.	-64.	-72.	
STANDARD DEVIATION TEMP.	2.3	2.5	2.7	2.5	2.7	3.0	3.3	3.6	2.9	2.6	3.8	
CORRLN.-SURF.PRES./TEMP.	-0.35	-0.57	-0.54	-0.31	-0.29	-0.34	-0.37	-0.36	-0.22	0.06	0.19	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.67	0.62	0.51	0.51	0.50	0.44	0.36	0.10	-0.22	-0.34	
MEAN MIXING RATIO GM/KG.	11.3	8.4	5.9	3.8	2.5	1.6	0.8	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	-0.21	-0.21	-0.08	-0.07	-0.13	-0.18	-0.22	-0.13	-0.01	0.07	
CONDITIONAL FACTOR FT	1.00	0.60	0.58	0.51	0.55	0.56	0.50	0.41	0.24	-0.26	-0.51	
FRACT. COND.N. FACT GP	0.0	-0.75	-0.77	-0.29	-0.28	-0.49	-0.72	-0.92	-0.62	-0.04	0.33	
FRACT. COND.N. FACT GT	1.00	0.61	0.60	0.54	0.60	0.62	0.59	0.51	0.05	-0.37	-0.74	

WINTER		MEAN SURFACE PRESSURE 1019.8 MB STANDARD DEVIATION IN SURF.PRESS. 5.3 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	15.	9.	4.	-1.	-7.	-16.	-26.	-38.	-53.	-61.	-67.	
STANDARD DEVIATION TEMP.	2.3	2.3	2.5	3.0	3.3	3.5	4.1	4.4	3.2	3.9	3.9	
CORRLN.-SURF.PRES./TEMP.	-0.07	-0.10	-0.15	0.02	0.05	0.04	-0.05	-0.12	-0.23	-0.11	-0.18	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.47	0.33	0.30	0.29	0.26	0.14	-0.02	-0.08	-0.05	-0.16	
MEAN MIXING RATIO GM/KG.	6.5	4.8	3.5	2.4	1.7	1.1	0.5	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	-0.03	-0.06	0.03	0.04	0.24	-0.03	-0.10	-0.14	-0.09	-0.14	
CONDITIONAL FACTOR FT	1.00	0.47	0.35	0.40	0.44	0.42	0.24	-0.06	-0.13	-0.09	-0.30	
FRACT. COND.N. FACT GP	0.0	-0.10	-0.22	0.10	0.17	0.15	-0.14	-0.45	-0.65	-0.41	-0.70	
FRACT. COND.N. FACT GT	1.00	0.48	0.36	0.42	0.47	0.48	0.28	-0.08	-0.17	-0.13	-0.42	

TABLE 1(CONTD.).

## (d) Guildford

SPRING		MEAN SURFACE PRESSURE 1017.2 MB STANDARD DEVIATION IN SURF.PRESS. 5.9 MB									
PRESSURE MB	ALTITUDE KM	1000	900	800	700	600	500	400	300	200	100
		0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	16.0
MEAN TEMPERATURE DEG C		12.	8.	4.	-1.	-8.	-17.	-29.	-42.	-53.	-63.
STANDARD DEVIATION TEMP.		3.2	4.3	4.2	3.6	3.5	3.5	3.6	3.9	3.7	3.6
CORRLN.-SURF.PRES./TEMP.		-0.41	-0.21	0.05	0.17	0.14	0.09	-0.03	-0.26	-0.28	-0.11
CORRLN.-SURF.TEMP./TEMP.		1.00	0.65	0.47	0.38	0.34	0.35	0.32	0.16	-0.18	-0.19
MEAN MIXING RATIO GM/KG.		6.6	4.5	3.0	2.0	1.3	0.7	0.4	0.0	0.0	0.0
CONDITIONAL FACTOR FP		0.0	0.04	0.21	0.24	0.20	0.16	0.07	-0.16	-0.27	-0.14
CONDITIONAL FACTOR FT		1.00	0.91	0.79	0.62	0.53	0.51	0.41	0.08	-0.41	-0.32
FRACT. COND. FACT GP		0.0	0.16	0.78	0.91	0.78	0.65	0.31	-0.70	-1.23	-0.66
FRACT. COND. FACT GT		1.00	0.93	0.81	0.65	0.57	0.57	0.48	0.10	-0.53	-0.42

SUMMER		MEAN SURFACE PRESSURE 1012.2 MB STANDARD DEVIATION IN SURF.PRESS. 4.2 MB									
PRESSURE MB	ALTITUDE KM	1000	900	800	700	600	500	400	300	200	100
		0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	16.0
MEAN TEMPERATURE DEG C		19.	17.	13.	7.	-1.	-11.	-23.	-38.	-55.	-70.
STANDARD DEVIATION TEMP.		3.7	5.9	4.0	2.6	2.6	2.6	2.9	3.3	3.3	2.6
CORRLN.-SURF.PRES./TEMP.		-0.39	-0.37	-0.30	-0.16	-0.23	-0.29	-0.20	-0.31	-0.30	-0.01
CORRLN.-SURF.TEMP./TEMP.		1.00	0.72	0.58	0.28	0.01	0.06	0.12	0.10	0.04	-0.05
MEAN MIXING RATIO GM/KG.		8.3	5.8	4.0	3.1	2.1	1.2	0.6	0.0	0.0	0.0
CONDITIONAL FACTOR FP		0.0	-0.14	-0.09	-0.03	-0.02	-0.05	-0.12	-0.25	-0.26	-0.02
CONDITIONAL FACTOR FT		1.00	1.10	0.89	0.19	-0.20	0.02	0.04	-0.02	-0.08	-0.05
FRACT. COND. FACT GP		0.0	-0.49	-0.31	-0.12	-0.08	-0.18	-0.49	-1.06	-1.20	-0.09
FRACT. COND. FACT GT		1.00	1.11	0.60	0.20	-0.21	0.02	0.05	-0.02	-0.10	-0.06

AUTUMN		MEAN SURFACE PRESSURE 1015.5 MB STANDARD DEVIATION IN SURF.PRESS. 4.8 MB									
PRESSURE MB	ALTITUDE KM	1000	900	800	700	600	500	400	300	200	100
		0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	16.0
MEAN TEMPERATURE DEG C		16.	14.	10.	4.	-3.	-12.	-24.	-39.	-55.	-69.
STANDARD DEVIATION TEMP.		4.0	5.2	4.2	3.3	3.1	3.3	3.5	3.8	3.7	2.9
CORRLN.-SURF.PRES./TEMP.		-0.45	-0.37	-0.22	-0.13	-0.13	-0.23	-0.29	-0.35	-0.27	0.07
CORRLN.-SURF.TEMP./TEMP.		1.00	0.72	0.59	0.45	0.38	0.44	0.51	0.47	0.23	-0.26
MEAN MIXING RATIO GM/KG.		7.9	6.0	4.2	3.0	2.1	1.2	0.6	0.0	0.0	0.0
CONDITIONAL FACTOR FP		0.0	-0.06	0.05	0.06	0.04	-0.02	-0.06	-0.13	-0.16	-0.04
CONDITIONAL FACTOR FT		1.00	0.91	0.66	0.40	0.31	0.35	0.41	0.37	0.13	-0.21
FRACT. COND. FACT GP		0.0	-0.21	0.19	0.22	0.13	-0.10	-0.23	-0.58	-0.74	-0.18
FRACT. COND. FACT GT		1.00	0.91	0.67	0.42	0.33	0.39	0.48	0.46	0.17	-0.29

WINTER		MEAN SURFACE PRESSURE 1017.1 MB STANDARD DEVIATION IN SURF.PRESS. 7.0 MB									
PRESSURE MB	ALTITUDE KM	1000	900	800	700	600	500	400	300	200	100
		0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	16.0
MEAN TEMPERATURE DEG C		10.	7.	2.	-3.	-10.	-19.	-30.	-43.	-53.	-63.
STANDARD DEVIATION TEMP.		3.2	2.7	2.7	2.0	2.2	2.4	2.8	4.9	3.7	3.8
CORRLN.-SURF.PRES./TEMP.		-0.55	-0.27	0.17	0.24	0.22	0.13	0.00	-0.25	-0.27	-0.14
CORRLN.-SURF.TEMP./TEMP.		1.00	0.66	0.20	0.19	0.14	0.21	0.21	0.20	-0.00	-0.09
MEAN MIXING RATIO GM/KG.		6.4	4.9	3.4	2.1	1.3	0.9	0.4	0.0	0.0	0.0
CONDITIONAL FACTOR FP		0.0	0.04	0.17	0.32	0.31	0.18	0.11	-0.14	-0.22	-0.16
CONDITIONAL FACTOR FT		1.00	0.92	0.39	0.37	0.41	0.45	0.39	0.12	-0.28	-0.31
FRACT. COND. FACT GP		0.0	0.15	0.65	0.93	0.92	0.73	0.45	-0.60	-1.00	-0.76
FRACT. COND. FACT GT		1.00	0.84	0.41	0.39	0.44	0.57	0.45	0.14	-0.36	-0.42

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TABLE 1 (CONTD.).

(e) Hobart

SPRING		MEAN SURFACE PRESSURE 1012.6 MB STANDARD DEVIATION IN SURF. PRESS. 10.3 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	11.	4.	-0.	-6.	-13.	-22.	-34.	-48.	-53.	-57.	-53.
STANDARD DEVIATION TEMP.	3.0	3.8	4.4	4.0	4.0	4.0	3.7	3.1	5.7	3.9	3.7
CORRLN.-SURF.PRES./TEMP.	-0.09	-0.11	0.15	0.26	0.28	0.26	0.23	-0.10	-0.51	-0.55	-0.45
CORRLN.-SURF.TEMP./TEMP.	1.00	0.77	0.67	0.44	0.40	0.59	0.56	0.37	-0.24	-0.29	-0.31
MEAN MIXING RATIO GM/KG.	5.1	3.9	2.6	1.7	1.1	0.6	0.3	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.01	0.09	0.11	0.13	0.12	0.10	-0.02	-0.29	-0.22	-0.17
CONDITIONAL FACTOR FT	1.00	0.97	1.02	1.07	1.03	0.92	0.73	0.37	-0.55	-0.44	-0.43
FRACT. COND. FACT GP	0.0	-0.05	0.33	0.47	0.51	0.49	0.43	-0.08	-1.35	-1.00	-0.79
FRACT. COND. FACT GT	1.00	0.99	1.06	0.96	0.91	0.93	0.96	0.47	-0.72	-0.57	-0.56

SUMMER		MEAN SURFACE PRESSURE 1011.2 MB STANDARD DEVIATION IN SURF. PRESS. 9.9 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	16.	8.	4.	-0.	-7.	-16.	-28.	-43.	-55.	-57.	-58.
STANDARD DEVIATION TEMP.	3.4	4.8	5.3	4.6	4.1	4.0	4.0	3.6	5.3	4.2	3.9
CORRLN.-SURF.PRES./TEMP.	-0.11	-0.13	0.15	0.28	0.32	0.30	0.24	0.06	-0.46	-0.47	-0.44
CORRLN.-SURF.TEMP./TEMP.	1.00	0.83	0.70	0.63	0.53	0.51	0.50	0.40	-0.22	-0.39	-0.39
MEAN MIXING RATIO GM/KG.	6.5	4.9	3.4	2.4	1.6	0.9	0.4	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.02	0.14	0.18	0.18	0.16	0.14	0.04	-0.29	-0.25	-0.22
CONDITIONAL FACTOR FT	1.00	1.17	1.12	0.90	0.69	0.66	0.64	0.43	-0.42	-0.56	-0.52
FRACT. COND. FACT GP	0.0	-0.08	0.50	0.68	0.68	0.64	0.56	0.18	-1.35	-1.16	-1.03
FRACT. COND. FACT GT	1.00	1.20	1.17	0.95	0.75	0.74	0.75	0.54	-0.56	-0.75	-0.70

AUTUMN		MEAN SURFACE PRESSURE 1016.0 MB STANDARD DEVIATION IN SURF. PRESS. 9.0 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	14.	9.	4.	-1.	-8.	-18.	-29.	-44.	-57.	-57.	-59.
STANDARD DEVIATION TEMP.	3.2	4.2	4.5	4.0	3.9	3.9	4.0	3.5	5.3	4.0	3.6
CORRLN.-SURF.PRES./TEMP.	-0.18	-0.10	0.17	0.28	0.28	0.25	0.21	0.02	-0.41	-0.45	-0.41
CORRLN.-SURF.TEMP./TEMP.	1.00	0.74	0.59	0.55	0.55	0.54	0.54	0.46	-0.02	-0.28	-0.36
MEAN MIXING RATIO GM/KG.	6.3	4.8	3.3	2.2	1.5	0.9	0.4	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	0.01	0.14	0.18	0.17	0.16	0.14	0.04	-0.25	-0.23	-0.20
CONDITIONAL FACTOR FT	1.00	1.00	0.92	0.80	0.76	0.75	0.76	0.54	-0.17	-0.47	-0.51
FRACT. COND. FACT GP	0.0	0.05	0.52	0.67	0.65	0.62	0.59	0.18	-1.18	-1.07	-0.94
FRACT. COND. FACT GT	1.00	1.02	0.95	0.85	0.82	0.85	0.89	0.68	-0.22	-0.63	-0.69

WINTER		MEAN SURFACE PRESSURE 1015.7 MB STANDARD DEVIATION IN SURF. PRESS. 11.0 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	7.	3.	-1.	-7.	-15.	-25.	-37.	-51.	-56.	-54.	-55.
STANDARD DEVIATION TEMP.	2.9	2.7	3.3	3.2	3.3	3.4	3.5	3.0	5.8	3.7	3.1
CORRLN.-SURF.PRES./TEMP.	-0.31	-0.13	0.19	0.30	0.32	0.31	0.32	0.09	-0.56	-0.52	-0.40
CORRLN.-SURF.TEMP./TEMP.	1.00	0.44	0.23	0.26	0.29	0.29	0.25	0.16	-0.02	-0.03	-0.05
MEAN MIXING RATIO GM/KG.	4.6	3.7	2.4	1.5	0.9	0.5	0.2	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	0.00	0.09	0.12	0.14	0.13	0.14	0.04	-0.33	-0.20	-0.13
CONDITIONAL FACTOR FT	1.00	0.41	0.36	0.43	0.48	0.49	0.45	0.21	-0.41	-0.26	-0.20
FRACT. COND. FACT GP	0.0	0.01	0.32	0.47	0.54	0.55	0.58	0.19	-1.53	-0.91	-0.60
FRACT. COND. FACT GT	1.00	0.41	0.37	0.45	0.53	0.55	0.53	0.26	-0.53	-0.33	-0.25



TABLE 1(CONTD.).

## (f) Laverton

SPRING		MEAN SURFACE PRESSURE 1014.3 MB STANDARD DEVIATION IN SURF.PRESS. 7.9 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	13.	6.	2.	-4.	-11.	-20.	-32.	-46.	-52.	-54.	-56.	
STANDARD DEVIATION TEMP.	3.3	4.7	4.5	3.9	3.8	3.9	3.8	3.6	5.0	3.5	3.5	
CORRLN.-SURF.PRES./TEMP.	-0.14	-0.13	0.11	0.27	0.27	0.23	0.18	-0.19	-0.44	-0.41	-0.32	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.77	0.68	0.59	0.55	0.55	0.55	0.33	-0.25	-0.39	-0.43	
MEAN MIXING RATIO GM/KG.	6.1	4.1	2.8	2.0	1.3	0.7	0.3	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	-0.01	0.12	0.17	0.17	0.16	0.13	-0.07	-0.31	-0.21	-0.17	
CONDITIONAL FACTOR FT	1.00	1.09	0.97	0.75	0.68	0.71	0.68	0.33	-0.49	-0.49	-0.52	
FRACT. COND. FACT GP	0.0	-0.05	0.44	0.66	0.66	0.62	0.53	-0.29	-1.42	-0.98	-0.81	
FRACT. COND. FACT GT	1.00	1.12	1.01	0.80	0.74	0.80	0.80	0.41	-0.63	-0.64	-0.68	

SUMMER		MEAN SURFACE PRESSURE 1011.5 MB STANDARD DEVIATION IN SURF.PRESS. 5.9 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	19.	12.	8.	3.	-5.	-14.	-25.	-41.	-56.	-59.	-63.	
STANDARD DEVIATION TEMP.	4.6	6.2	5.1	3.9	3.4	3.4	3.6	3.6	4.6	3.7	4.1	
CORRLN.-SURF.PRES./TEMP.	-0.27	-0.21	0.01	0.15	0.19	0.11	0.05	-0.14	-0.31	-0.24	-0.18	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.82	0.65	0.50	0.39	0.42	0.43	0.33	-0.14	-0.36	-0.41	
MEAN MIXING RATIO GM/KG.	7.9	5.6	4.0	2.9	1.9	1.1	0.6	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.00	0.01	0.17	0.20	0.18	0.14	0.10	-0.04	-0.29	-0.23	-0.21	
CONDITIONAL FACTOR FT	1.00	1.08	0.78	0.49	0.35	0.36	0.37	0.25	-0.23	-0.36	-0.44	
FRACT. COND. FACT GP	0.00	0.03	0.61	0.73	0.60	0.54	0.43	-0.16	-1.36	-1.07	-1.03	
FRACT. COND. FACT GT	1.00	1.11	0.91	0.52	0.30	0.40	0.43	0.31	-0.31	-0.50	-0.61	

AUTUMN		MEAN SURFACE PRESSURE 1016.4 MB STANDARD DEVIATION IN SURF.PRESS. 6.3 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	16.	10.	7.	1.	-6.	-15.	-27.	-42.	-56.	-59.	-63.	
STANDARD DEVIATION TEMP.	3.6	4.8	4.1	3.4	3.3	3.5	3.6	3.6	4.9	3.6	3.8	
CORRLN.-SURF.PRES./TEMP.	-0.23	-0.16	0.08	0.21	0.18	0.08	0.03	-0.11	-0.37	-0.32	-0.26	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.74	0.60	0.46	0.45	0.50	0.51	0.46	0.06	-0.33	-0.40	
MEAN MIXING RATIO GM/KG.	7.4	5.3	3.7	2.6	1.7	1.0	0.5	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	0.01	0.15	0.18	0.16	0.12	0.09	-0.00	-0.29	-0.24	-0.22	
CONDITIONAL FACTOR FT	1.00	0.97	0.73	0.51	0.47	0.53	0.55	0.46	-0.03	-0.43	-0.52	
FRACT. COND. FACT GP	0.0	0.03	0.55	0.67	0.59	0.46	0.38	-0.01	-1.36	-1.15	-1.08	
FRACT. COND. FACT GT	1.00	0.99	0.76	0.53	0.51	0.59	0.65	0.58	-0.05	-0.58	-0.71	

WINTER		MEAN SURFACE PRESSURE 1017.6 MB STANDARD DEVIATION IN SURF.PRESS. 8.7 MB										
PRESSURE MB	1000	900	800	700	600	500	400	300	200	150	100	
ALTITUDE KM	0.0	1.0	2.0	3.0	4.2	5.6	7.2	9.2	11.8	13.6	16.0	
MEAN TEMPERATURE DEG C	8.	4.	-0.	-5.	-13.	-23.	-35.	-49.	-54.	-54.	-57.	
STANDARD DEVIATION TEMP.	2.9	2.9	3.1	3.1	3.3	3.5	3.6	3.6	5.1	3.6	3.4	
CORRLN.-SURF.PRES./TEMP.	-0.32	-0.11	0.25	0.37	0.35	0.33	0.31	-0.02	-0.55	-0.47	-0.39	
CORRLN.-SURF.TEMP./TEMP.	1.00	0.39	0.19	0.19	0.21	0.22	0.18	0.15	0.02	-0.25	-0.10	
MEAN MIXING RATIO GM/KG.	5.3	3.7	2.6	1.6	1.0	0.6	0.2	0.0	0.0	0.0	0.0	
CONDITIONAL FACTOR FP	0.0	0.00	0.13	0.17	0.18	0.18	0.17	0.01	-0.37	-0.23	-0.18	
CONDITIONAL FACTOR FT	1.00	0.38	0.33	0.27	0.41	0.44	0.39	0.20	-0.32	-0.28	-0.30	
FRACT. COND. FACT GP	0.0	0.02	0.47	0.64	0.69	0.72	0.72	0.06	-1.72	-1.05	-0.84	
FRACT. COND. FACT GT	1.00	0.38	0.34	0.39	0.45	0.49	0.46	0.25	-0.42	-0.36	-0.39	

TABLE 1(CONTD.).

## (g) Nowra

SPRING		MEAN SURFACE PRESSURE STANDARD DEVIATION IN SURF.PRESS. 1004.1 MB 8.0 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	15.	8.	3.	-3.	-10.	-19.	-31.	-44.	-52.	-55.	-58.
STANDARD DEVIATION TEMP.	3.6	4.2	4.1	3.6	3.6	3.9	3.6	3.4	4.7	3.6	3.6
CORRLN.-SURF.PRES./TEMP.	-0.11	-0.16	-0.03	0.11	0.11	0.14	0.09	-0.09	-0.30	-0.28	-0.22
CORRLN.-SURF.TEMP./TEMP.	1.00	0.85	0.76	0.66	0.63	0.59	0.55	0.27	-0.33	-0.39	-0.45
MEAN MIXING RATIO GM/KG.	6.3	4.6	3.3	2.2	1.4	0.8	0.4	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.04	0.03	0.08	0.08	0.10	0.07	-0.03	-0.20	-0.14	-0.12
CONDITIONAL FACTOR FT	1.00	0.99	0.88	0.69	0.66	0.64	0.57	0.25	-0.49	-0.42	-0.48
FRACT. COND.N. FACT GP	0.0	-0.13	0.09	0.30	0.31	0.38	0.29	-0.12	-0.91	-0.67	-0.57
FRACT. COND.N. FACT GT	1.00	1.01	0.91	0.74	0.72	0.73	0.68	0.32	-0.64	-0.56	-0.64

SUMMER		MEAN SURFACE PRESSURE STANDARD DEVIATION IN SURF.PRESS. 1000.4 MB 6.2 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	21.	14.	10.	4.	-3.	-12.	-24.	-39.	-55.	-60.	-65.
STANDARD DEVIATION TEMP.	3.5	4.7	4.2	3.3	3.1	3.2	3.5	3.8	4.2	3.4	4.2
CORRLN.-SURF.PRES./TEMP.	-0.26	-0.35	-0.16	0.03	0.10	0.09	0.01	-0.01	-0.06	-0.02	-0.13
CORRLN.-SURF.TEMP./TEMP.	1.00	0.82	0.72	0.55	0.38	0.35	0.35	0.28	0.01	-0.29	-0.32
MEAN MIXING RATIO GM/KG.	9.2	6.9	4.9	3.3	2.1	1.3	0.7	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.11	0.02	0.10	0.11	0.10	0.06	0.04	-0.04	-0.03	-0.16
CONDITIONAL FACTOR FT	1.00	1.04	0.87	0.56	0.39	0.36	0.37	0.32	-0.01	-0.29	-0.45
FRACT. COND.N. FACT GP	0.0	-0.40	0.06	0.36	0.40	0.38	0.25	0.18	-0.20	-0.15	-0.75
FRACT. COND.N. FACT GT	1.00	1.07	0.90	0.60	0.43	0.40	0.44	0.40	-0.01	-0.39	-0.63

AUTUMN		MEAN SURFACE PRESSURE STANDARD DEVIATION IN SURF.PRESS. 1005.3 MB 6.5 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	18.	12.	7.	2.	-5.	-14.	-26.	-41.	-55.	-59.	-64.
STANDARD DEVIATION TEMP.	3.1	3.8	3.5	3.1	3.1	3.4	3.4	3.8	4.3	3.1	3.8
CORRLN.-SURF.PRES./TEMP.	-0.26	-0.33	-0.26	-0.03	0.03	-0.04	-0.10	-0.22	-0.25	-0.07	0.00
CORRLN.-SURF.TEMP./TEMP.	1.00	0.81	0.72	0.61	0.54	0.58	0.56	0.46	0.06	-0.29	-0.43
MEAN MIXING RATIO GM/KG.	8.4	6.1	4.3	2.9	2.0	1.1	0.5	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.07	-0.04	0.07	0.09	0.07	0.03	-0.06	-0.17	-0.08	-0.07
CONDITIONAL FACTOR FT	1.00	0.97	0.81	0.64	0.60	0.67	0.64	0.53	-0.00	-0.34	-0.57
FRACT. COND.N. FACT GP	0.0	-0.26	-0.14	0.24	0.34	0.25	0.11	-0.28	-0.78	-0.36	-0.34
FRACT. COND.N. FACT GT	1.00	0.99	0.84	0.68	0.65	0.76	0.76	0.66	-0.00	-0.46	-0.79

WINTER		MEAN SURFACE PRESSURE STANDARD DEVIATION IN SURF.PRESS. 1006.3 MB 8.7 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	11.	6.	1.	-5.	-12.	-22.	-34.	-47.	-53.	-55.	-58.
STANDARD DEVIATION TEMP.	2.3	2.7	3.0	3.0	3.3	3.4	3.7	3.9	4.5	3.6	3.8
CORRLN.-SURF.PRES./TEMP.	-0.15	-0.05	0.01	0.20	0.21	0.20	0.18	-0.08	-0.42	-0.38	-0.43
CORRLN.-SURF.TEMP./TEMP.	1.00	0.58	0.51	0.45	0.42	0.39	0.36	0.16	-0.18	-0.23	-0.20
MEAN MIXING RATIO GM/KG.	5.2	3.9	2.9	1.9	1.2	0.7	0.3	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	0.21	0.03	0.10	0.11	0.10	0.10	-0.01	-0.24	-0.18	-0.21
CONDITIONAL FACTOR FT	1.00	0.69	0.56	0.65	0.62	0.62	0.62	0.27	-0.48	-0.45	-0.44
FRACT. COND.N. FACT GP	0.0	0.24	0.12	0.36	0.41	0.41	0.43	-0.06	-1.07	-0.81	-0.97
FRACT. COND.N. FACT GT	1.00	0.70	0.69	0.68	0.71	0.70	0.73	0.34	-0.61	-0.59	-0.59

TABLE 1(CONTD.).

## (h) Townsville

## SPRING

MEAN SURFACE PRESSURE 1016.2 MB  
STANDARD DEVIATION IN SURF.PRESS. 2.8 MB

PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	25.	16.	12.	6.	0.	-8.	-18.	-33.	-53.	-67.	-76.
STANDARD DEVIATION TEMP.	2.0	2.5	2.8	2.3	2.3	2.2	2.2	1.9	1.4	1.7	2.6
CORRLN.-SURF.PRES./TEMP.	-0.45	-0.63	-0.55	-0.14	0.00	-0.05	-0.03	0.03	-0.04	0.00	0.19
CORRLN.-SURF.TEMP./TEMP.	1.00	0.63	0.50	0.19	0.07	0.01	-0.11	-0.09	0.08	0.07	-0.17
MEAN MIXING RATIO GM/KG.	11.0	7.8	5.0	3.6	2.4	1.4	0.8	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.39	-0.40	-0.05	0.03	-0.05	-0.08	-0.01	-0.00	0.03	0.13
CONDITIONAL FACTOR FT	1.00	0.54	0.44	0.19	0.10	-0.02	-0.17	-0.09	0.06	0.08	-0.14
FRACT. CONDEN. FACT GP	0.0	-1.36	-1.44	-0.18	0.13	-0.19	-0.33	-0.03	-0.01	0.13	0.69
FRACT. CONDEN. FACT GT	1.00	0.56	0.46	0.20	0.11	-0.03	-0.20	-0.11	0.08	0.11	-0.21

## SUMMER

MEAN SURFACE PRESSURE 1009.3 MB  
STANDARD DEVIATION IN SURF.PRESS. 3.3 MB

PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	28.	19.	15.	9.	2.	-6.	-17.	-31.	-53.	-66.	-80.
STANDARD DEVIATION TEMP.	1.9	2.0	2.1	1.6	1.8	1.7	2.0	2.0	1.6	1.5	2.6
CORRLN.-SURF.PRES./TEMP.	-0.05	-0.50	-0.32	-0.18	-0.20	-0.33	-0.40	-0.44	-0.23	-0.01	0.15
CORRLN.-SURF.TEMP./TEMP.	1.00	0.48	0.42	0.15	0.08	0.05	-0.07	-0.12	-0.01	0.03	-0.04
MEAN MIXING RATIO GM/KG.	15.6	11.5	7.7	5.4	3.8	2.4	1.2	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.29	-0.19	-0.08	-0.11	-0.16	-0.24	-0.27	-0.11	-0.01	0.11
CONDITIONAL FACTOR FT	1.00	0.47	0.46	0.12	0.07	0.03	-0.09	-0.14	-0.02	0.02	-0.05
FRACT. CONDEN. FACT GP	0.0	-0.99	-0.68	-0.30	-0.24	-0.62	-0.95	-1.12	-0.50	-0.03	0.59
FRACT. CONDEN. FACT GT	1.00	0.48	0.46	0.13	0.03	0.03	-0.11	-0.18	-0.02	0.04	-0.08

## AUTUMN

MEAN SURFACE PRESSURE 1012.6 MB  
STANDARD DEVIATION IN SURF.PRESS. 3.3 MB

PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	26.	18.	13.	8.	3.	-6.	-17.	-32.	-53.	-67.	-79.
STANDARD DEVIATION TEMP.	1.6	1.8	2.0	2.0	1.8	1.8	2.0	2.0	1.5	1.6	2.8
CORRLN.-SURF.PRES./TEMP.	-0.30	-0.62	-0.53	-0.24	-0.21	-0.34	-0.47	-0.48	-0.39	-0.07	0.33
CORRLN.-SURF.TEMP./TEMP.	1.00	0.55	0.49	0.17	0.24	0.23	0.20	0.17	0.20	0.14	-0.22
MEAN MIXING RATIO GM/KG.	14.0	10.5	7.3	5.1	3.6	2.3	1.1	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.28	-0.25	-0.12	-0.08	-0.16	-0.27	-0.29	-0.16	-0.01	0.25
CONDITIONAL FACTOR FT	1.00	0.44	0.44	0.13	0.21	0.15	0.07	0.03	0.08	0.13	-0.21
FRACT. CONDEN. FACT GP	0.0	-0.96	-0.90	-0.44	-0.29	-0.62	-1.07	-1.20	-0.73	-0.07	1.29
FRACT. CONDEN. FACT GT	1.00	0.45	0.46	0.14	0.23	0.17	0.09	0.04	0.12	0.18	-0.33

## WINTER

MEAN SURFACE PRESSURE 1018.0 MB  
STANDARD DEVIATION IN SURF.PRESS. 2.6 MB

PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	20.	13.	10.	6.	0.	-8.	-18.	-33.	-54.	-67.	-76.
STANDARD DEVIATION TEMP.	2.1	2.3	2.7	2.8	2.5	2.4	2.4	2.0	1.6	1.9	2.7
CORRLN.-SURF.PRES./TEMP.	-0.21	-0.47	-0.28	-0.10	-0.12	-0.10	-0.10	-0.09	-0.09	-0.01	0.08
CORRLN.-SURF.TEMP./TEMP.	1.00	0.66	0.16	0.08	0.07	0.05	-0.05	-0.11	0.00	0.09	-0.06
MEAN MIXING RATIO GM/KG.	8.6	6.6	4.9	3.2	2.2	1.4	0.8	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FP	0.0	-0.30	-0.27	-0.10	-0.10	-0.09	-0.11	-0.10	-0.06	0.01	0.07
CONDITIONAL FACTOR FT	1.00	0.64	0.14	0.09	0.06	0.04	-0.09	-0.13	-0.01	0.08	-0.06
FRACT. CONDEN. FACT GP	0.0	-1.06	-0.97	-0.36	-0.38	-0.33	-0.44	-0.41	-0.26	0.03	0.36
FRACT. CONDEN. FACT GT	1.00	0.65	0.15	0.09	0.07	0.04	-0.10	-0.16	-0.02	0.12	-0.09

TABLE 1 (CONTD.).

## (i) Woomera

SPRING		MEAN SURFACE PRESSURE 999.0 MB STANDARD DEVIATION IN SURF.PRESS. 5.7 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	16.	10.	4.	0.	-7.	-16.	-24.	-41.	-52.	-58.	-63.
STANDARD DEVIATION TEMP.	4.6	5.5	4.4	3.7	3.3	3.3	3.7	4.2	3.2	3.6	3.9
CORREL.-SURF.PRES./TEMP.	-0.20	-0.35	-0.23	-0.13	-0.11	-0.15	-0.21	-0.27	-0.07	0.07	0.02
CORREL.-SURF.TEMP./TEMP.	1.00	0.89	0.76	0.68	0.55	0.53	0.50	0.24	-0.33	-0.45	-0.45
MEAN MIXING RATIO GM/KG.	5.8	4.1	3.1	2.4	1.9	1.0	0.5	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FF	0.0	-0.11	-0.01	0.04	0.03	-0.00	-0.05	-0.16	-0.10	-0.04	-0.08
CONDITIONAL FACTOR FT	1.00	1.04	0.75	0.56	0.40	0.38	0.38	0.17	-0.27	-0.36	-0.41
FRACT. COND. FACT GP	0.0	-0.36	-0.04	0.16	0.10	-0.00	-0.21	-0.69	-0.46	-0.17	-0.37
FRACT. COND. FACT GT	1.00	1.06	0.76	0.59	0.44	0.43	0.45	0.21	-0.35	-0.49	-0.57
SUMMER		MEAN SURFACE PRESSURE 993.7 MB STANDARD DEVIATION IN SURF.PRESS. 4.1 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	24.	18.	13.	7.	-1.	-10.	-22.	-37.	-54.	-62.	-70.
STANDARD DEVIATION TEMP.	5.4	5.7	3.6	2.6	2.4	2.5	3.0	3.5	3.6	2.5	3.7
CORREL.-SURF.PRES./TEMP.	-0.35	-0.36	-0.38	-0.25	-0.11	-0.16	-0.29	-0.35	-0.25	0.01	0.25
CORREL.-SURF.TEMP./TEMP.	1.00	0.95	0.67	0.38	0.15	0.15	0.21	0.13	-0.03	-0.17	-0.29
MEAN MIXING RATIO GM/KG.	7.5	5.6	4.4	3.6	2.4	1.5	0.7	0.2	0.0	0.0	0.0
CONDITIONAL FACTOR FF	0.0	-0.14	-0.15	-0.08	-0.04	-0.07	-0.13	-0.29	-0.25	-0.03	0.15
CONDITIONAL FACTOR FT	1.00	0.87	0.41	0.16	0.06	0.05	0.07	0.01	-0.09	-0.09	-0.16
FRACT. COND. FACT GP	0.0	-0.47	-0.50	-0.30	-0.16	-0.28	-0.71	-1.21	-1.15	-0.16	0.73
FRACT. COND. FACT GT	1.00	0.99	0.43	0.17	0.06	0.06	0.08	0.01	-0.12	-0.13	-0.23
AUTUMN		MEAN SURFACE PRESSURE 999.1 MB STANDARD DEVIATION IN SURF.PRESS. 4.5 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	19.	15.	10.	4.	-3.	-12.	-24.	-39.	-54.	-61.	-68.
STANDARD DEVIATION TEMP.	4.5	5.1	3.5	2.9	3.0	3.2	3.5	3.9	3.9	2.9	4.0
CORREL.-SURF.PRES./TEMP.	-0.42	-0.43	-0.33	-0.20	-0.16	-0.26	-0.31	-0.36	-0.25	0.08	0.16
CORREL.-SURF.TEMP./TEMP.	1.00	0.98	0.68	0.51	0.47	0.52	0.52	0.46	0.17	-0.28	-0.48
MEAN MIXING RATIO GM/KG.	7.1	5.2	4.1	3.0	2.1	1.2	0.6	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FF	0.00	-0.08	-0.05	0.01	0.03	-0.04	-0.09	-0.17	-0.19	-0.03	-0.05
CONDITIONAL FACTOR FT	1.00	0.97	0.51	0.33	0.32	0.36	0.38	0.33	0.06	-0.19	-0.45
FRACT. COND. FACT GP	0.00	-0.27	-0.16	0.04	0.11	-0.14	-0.34	-0.73	-0.95	-0.14	-0.24
FRACT. COND. FACT GT	1.00	0.99	0.52	0.35	0.35	0.40	0.44	0.41	0.08	-0.27	-0.64
WINTER		MEAN SURFACE PRESSURE 1001.9 MB STANDARD DEVIATION IN SURF.PRESS. 6.5 MB									
PRESSURE MB ALTITUDE KM	1000 0.0	900 1.0	800 2.0	700 3.0	600 4.2	500 5.6	400 7.2	300 9.2	200 11.8	150 13.6	100 16.0
MEAN TEMPERATURE DEG C	9.	7.	2.	-3.	-15.	-19.	-30.	-42.	-53.	-58.	-63.
STANDARD DEVIATION TEMP.	2.5	3.4	3.0	3.0	3.2	3.5	4.0	4.8	4.0	3.9	3.7
CORREL.-SURF.PRES./TEMP.	-0.30	-0.34	0.09	0.23	0.16	0.07	-0.09	-0.33	-0.26	0.02	-0.09
CORREL.-SURF.TEMP./TEMP.	1.00	0.98	0.32	0.26	0.29	0.29	0.29	0.20	-0.29	-0.22	-0.21
MEAN MIXING RATIO GM/KG.	5.3	4.0	2.6	1.9	1.4	0.9	0.5	0.0	0.0	0.0	0.0
CONDITIONAL FACTOR FF	0.0	-0.05	0.09	0.16	0.13	0.09	-0.01	-0.22	-0.19	-0.03	-0.10
CONDITIONAL FACTOR FT	1.00	0.72	0.45	0.44	0.47	0.48	0.44	0.21	-0.28	-0.36	-0.39
FRACT. COND. FACT GP	0.0	-0.34	0.34	0.50	0.50	0.36	-0.02	-0.95	-0.86	-0.13	-0.46
FRACT. COND. FACT GT	1.00	0.73	0.46	0.46	0.50	0.54	0.51	0.25	-0.36	-0.47	-0.53

TABLE 2. MEAN DIURNAL VARIATION IN SURFACE TEMPERATURE FROM 2300 U.T.

(a) BROOME					(b) DARWIN			
U.T.	SPRING	SUMMER	AUTUMN	WINTER	SPRING	SUMMER	AUTUMN	WINTER
2300	0	0	0	0	0	0	0	0
0100	3.5	2.0	4.0	4.3	2.9	1.6	2.1	3.4
0300	6.4	4.1	7.3	9.3	4.6	2.5	3.4	6.4
0500	7.3	5.1	8.5	10.6	5.1	3.0	4.2	7.6
0700	6.3	4.5	7.3	9.5	4.7	2.5	3.6	7.1
0900	4.8	3.5	5.7	7.9	3.3	1.3	2.2	5.3
1100	3.2	2.4	4.1	5.8	1.6	0.5	0.5	2.5
1300	1.5	1.1	2.5	3.8	0.3	-0.2	-0.2	0.8
1500	0	0	1.1	1.8	-0.7	-0.7	-0.7	-0.4
1700	-1.2	-1.1	0.1	-0.3	-1.5	-1.1	-1.2	-0.8
1900	-1.8	-1.2	-0.6	-2.2	-2.4	-1.6	-1.6	-1.3
2100	-1.4	-0.8	-0.3	-2.3	-2.3	-1.4	-1.4	-1.3

(c) EAGLE FARM					(d) GUILDFORD			
U.T.	SPRING	SUMMER	AUTUMN	WINTER	SPRING	SUMMER	AUTUMN	WINTER
2300	0	0	0	0	0	0	0	0
0100	1.4	1.7	2.4	3.3	3.8	4.4	3.5	1.9
0300	2.1	2.3	3.6	5.7	6.7	7.5	6.8	4.7
0500	2.1	1.7	3.2	5.7	8.2	9.6	9.2	6.8
0700	0.9	0.6	1.6	3.6	8.1	9.6	9.2	6.8
0900	-0.4	-0.7	-0.1	1.8	6.6	8.6	7.4	5.0
1100	-1.7	-1.9	-1.4	0	4.6	6.2	5.1	3.3
1300	-2.7	-2.8	-2.3	-1.0	2.4	3.1	3.1	2.0
1500	-3.7	-3.4	-2.8	-1.8	1.1	1.5	1.5	0.8
1700	-4.7	-4.1	-3.2	-2.3	0.1	0.1	0.6	0.4
1900	-5.2	-4.3	-3.9	-3.2	-0.6	-1.0	-0.3	0
2100	-4.3	-3.3	-3.6	-2.7	-0.9	-1.7	-0.6	-0.3

(e) HOBART					(f) LAVERTON			
U.T.	SPRING	SUMMER	AUTUMN	WINTER	SPRING	SUMMER	AUTUMN	WINTER
2300	0	0	0	0	0	0	0	0
0100	1.8	1.9	2.5	2.8	1.9	3.0	2.5	2.3
0300	3.3	2.9	3.8	4.3	3.6	5.3	4.6	5.1
0500	3.0	3.3	4.1	4.6	3.9	6.2	5.0	5.0
0700	1.7	2.3	2.8	3.2	2.7	5.7	3.8	3.6
0900	0.1	0.8	1.2	1.7	0.8	3.7	2.0	1.8
1100	-1.3	-1.0	-0.3	0.6	-0.8	0.4	-0.7	0.7
1300	-2.3	-2.3	-1.3	0.2	-1.9	-1.6	-1.8	0
1500	-2.8	-2.9	-2.0	-0.3	-2.6	-2.8	-2.3	-0.3
1700	-3.3	-3.6	-2.5	-0.5	-3.1	-3.6	-2.8	-0.4
1900	-3.7	-3.7	-2.8	-0.6	-3.5	-3.8	-3.2	-0.6
2100	-2.8	-2.4	-2.1	-0.6	-2.6	-3.1	-2.3	-0.4

TABLE 2(CONTD.).

(g) NOWRA					(h) TOWNSVILLE			
U.T.	SPRING	SUMMER	AUTUMN	WINTER	SPRING	SUMMER	AUTUMN	WINTER
2300	0	0	0	0	0	0	0	0
0100	2.1	1.7	1.8	3.6	1.5	1.5	1.9	3.0
0300	3.2	2.4	2.8	5.4	2.3	2.3	2.8	4.7
0500	3.0	2.4	2.6	5.8	1.9	1.9	2.5	4.6
0700	1.8	1.2	1.4	4.3	0.4	0.9	1.4	2.9
0900	0.8	0	0.3	2.8	-1.1	-0.3	0	1.3
1100	-0.7	-1.0	-0.7	1.3	-2.1	-1.3	-0.9	-0.6
1300	-1.8	-1.6	-1.6	0.2	-2.8	-1.6	-1.7	-1.8
1500	-2.8	-2.4	-2.5	-0.6	-3.6	-2.4	-2.6	-2.7
1700	-3.8	-3.0	-3.3	-1.3	-4.4	-2.8	-3.2	-3.6
1900	-4.4	-3.5	-4.0	-2.1	-5.2	-3.3	-3.8	-4.3
2100	-3.2	-2.7	-3.8	-1.4	-4.3	-2.5	-3.0	-3.3

(i) WOOMERA				
U.T.	SPRING	SUMMER	AUTUMN	WINTER
2300	0	0	0	0
0100	2.9	2.7	3.3	3.5
0300	5.6	5.9	6.3	6.6
0500	7.2	7.8	8.0	7.7
0700	7.0	8.5	8.2	7.2
0900	5.8	8.2	6.4	5.5
1100	3.0	7.0	3.7	3.2
1300	0.7	4.7	1.9	1.2
1500	-0.8	1.7	0.5	-0.1
1700	-2.3	-1.9	-1.2	-0.6
1900	-3.7	-4.4	-2.5	-1.0
2100	-3.3	-3.6	-2.5	-1.0

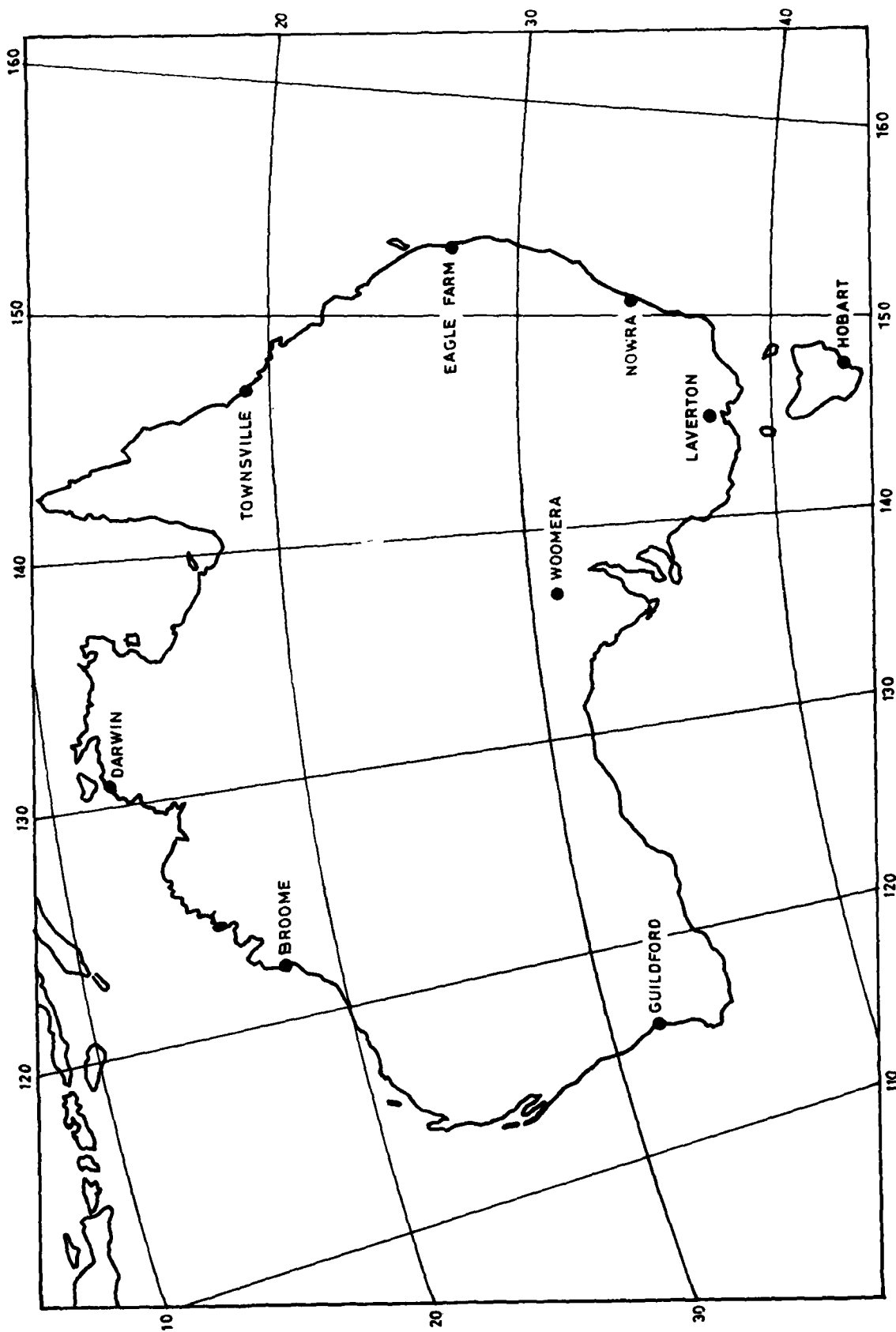


Figure 1. Sites for which meteorological statistics and weighting factors were calculated

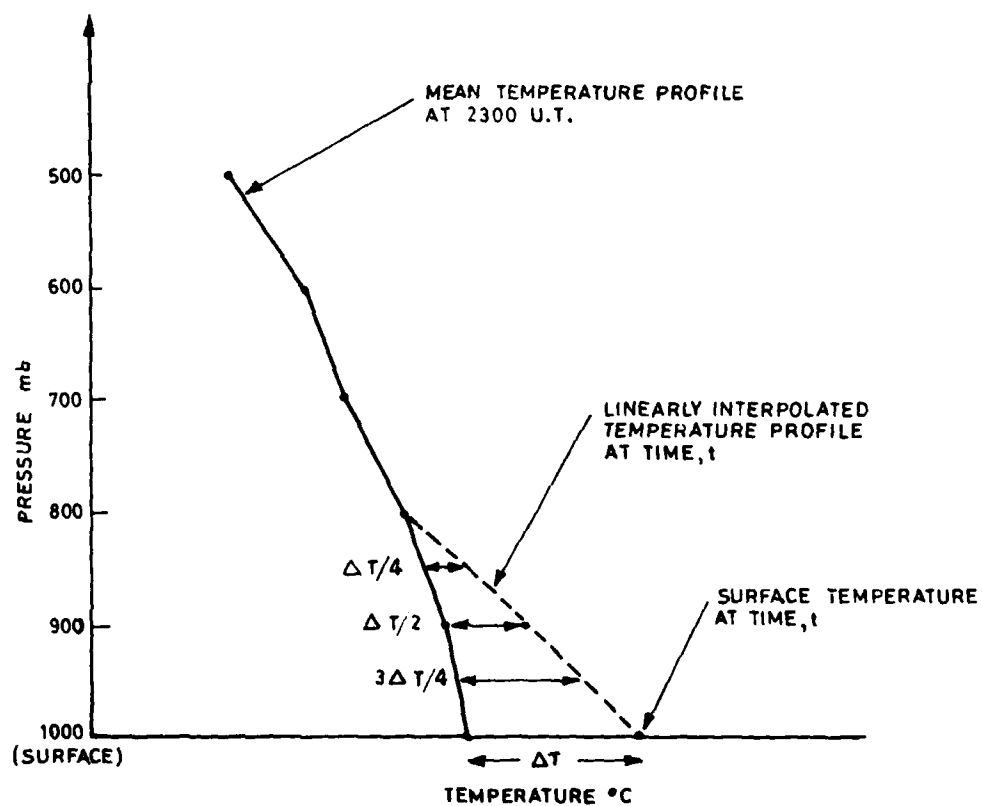


Figure 2. Illustrating the assumption that diurnal variation decreases linearly with altitude, to the 800 mb level



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## 16 SUMMARY OR ABSTRACT:

(if this is security classified, the announcement of this report will be similarly classified)

A method is presented for the estimation of the temperature profile, given measured surface values of temperature and pressure, using conditional factors which are functions of statistical meteorological parameters. Tables of mean temperature profiles, and of the conditional factors from which temperature profiles may be estimated, are presented for several sites around Australia. These tables can be used when, for example, radiosonde data are not available.

This work was carried out at Weapons Systems Research Laboratory in response to Army Office Research Request 1139/78 - Task ARM 78/060 entitled Artillery Use of Meteorological Statistics (AUMS).

